A securing device

FIELD OF THE INVENTION AND PRIOR ART

The present invention concerns a device for attaching a first part in the form of an instrument or tool to a second part in the form of a beam or such on a working machine according to the preamble of the attached claim 1.

The working machine can be of any type and trucks, front loaders, digging machines and demolition machines can be mentioned as examples, which in general are supplied with different types of working instruments or tools. Examples of such instruments are forks of different types, scoops, clamping units, man baskets, lever arms and other special types of equipment for handling special loads.

An attachment device of the type defined in the introduction is usually called "rapid attachment", because the attachment of instruments to the working machine can occur relatively quickly by making said engagement and then utilizing force of gravity to fixedly hold the instrument at the working machine's beam or such. "Engagement" is to be understood to have a broad meaning and can for example mean that hooks on the working instrument are held under the force of gravity and are clamped onto an outer edge of the holding frame of the working machine's

beam and the instrument is held against the frame and supported by the frame in some additional position. Such so-called rapid attachments are used for tools and instruments such as scoops, lever arms and other tools, which do not require any separate machine operation of any type. In prior art devices for attaching an instrument or a tool to a beam or such on a working machine according to the preamble of claim 1 there is a risk that the instrument or tool will gradually become more loosely attached on said beam or such because of the effect of the operation of the working machine on the device itself.

SUMMARY OF THE INVENTION

The aim of the present invention is to provide a device of the type defined in the introduction, which remedies the above-mentioned inconveniences associated with such prior art devices.

This aim is achieved according to the invention by providing such a device with the features that are given in the characterizing part of claim 1.

By providing the fixedly locking arrangement with resilient members in combination with the wedge element the gap in the attachment will constantly be automatically eliminated, because the resilient member constantly ensures that the wedge element is pushed as far as possible into the recess. Consequently the invention solves the problem effectively using surprisingly simple means.

The wedge element's wedge form is thereby preferably such that the wedge element will be pushed into the recess under the action of the internal walls of the recess in such a direction that the part that is provided with the recess is pushed with its engagement means having surfaces converging towards each other into an engagement-making direction.

According to another preferred embodiment of the invention the device also comprises controllable power means for transferring the locking arrangement between an inactive position and an active position with the wedge element pushed into the recess and held during pre-loading. The wedge element can hereby be held back and is not in the way of the insertion of the first engagement means in the second engagement means and it is then driven to the active locking position via the operation of the power means.

According to another preferred embodiment of the invention the locking arrangement connected with the wedge element comprises, a dead centre defining means, and the power means is designed to influence said dead centre means to transfer the wedge element from an inactive position to an active position located on the opposite side of a dead centre, in which the resilient member is solely responsible for holding the wedge element in the recess. The holding in locking position is hereby very reliable, as it does not depend on the power means being supplied with energy.

Advantageously the wedge element is arranged on the second part, i.e. the working machine, and the recess is arranged on the first part, i.e. the instrument or the tool.

According to a preferred embodiment of the invention the second, female-type engagement means has two opposite walls, converging towards one another, which laterally restrict a channel directed substantially vertically in the normal direction of the first part when attached to the second part and form said converging internal surfaces. Arranging the converging surfaces in this way results in a very stable holding of the first part in the second part. It is thereby advantageous that an internal large surface part of the second engagement means, that is substantially planar, forms the bottom of the canal and contacts an external surface part of the fist engagement means, that is

substantially planar, in the locked position. It is especially advantageous if two other walls, at least partly restricting the canal, extend substantially at a right angle relative to the formerly mentioned walls and converge towards each other to form said converging internal surfaces, since such a convergence of two planes lying cross-wise with respect to each other results in a very distinct locked position of the first part in the second part. It is more specially preferred if the other walls are formed from said substantially planar large surface parts.

According to another preferred embodiment of the invention the second, female-type engagement means has an opening intended to be turned towards the other part in a direction substantially perpendicular to the direction of convergence of this engagement means' converging surfaces during the engagement operation to facilitate the insertion of the male-type engagement means in the female-type engagement means. The driver of a working machine can hereby rapidly force the first engagement means into the second and lock the first part at the second part without nerve racking precision work being required.

Further advantages and advantageous features of the invention will be apparent from the following description and the other dependent claims.

BRIEF DESCRIPTION OF THE DRAWINGS

Preferred embodiments of the invention are described below by way of example with reference to the attached drawings, in which:

Fig 1 illustrates very schematically a conventional working machine with examples of some instruments to which the inventive attachment device could be applied,

Fig 2 is a perspective view of a female-type engagement means included in the inventive device fixed on an instrument,

Fig 3 is a perspective view of an end of a beam of a working machine with a male-type engagement means of the inventive attachment device attached thereon,

Fig 4 is a perspective view of the male-type engagement means according to Fig 3,

Fig 5 is a perspective view illustrating how the engagement means according to Fig 4 is intended to be inserted into the engagement means according to Fig 2 to attach the instrument to the working machine's beam by means of the attachment device according to the invention,

Fig 6 is a view of the locking arrangement included in the inventive device in an inactive position, and

Fig 7 is a view of the locking arrangement according to Fig 6 in an active locking position.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT OF THE INVENTION

Fig 1 illustrates a working machine 1 in the form of a front loader and some of the large number of different possible instruments, which could be attached by the inventive device to the machine's arms 2. A fork unit 3, a scoop 4 and a clamping unit 5 is shown here.

Fig 2 illustrates part of an attachment device according to a preferred embodiment of the invention, more particularly the part that is intended to be arranged on the instrument. A second, female type engagement means 7 of the inventive attachment

device is attached to an attachment frame 6 (that can even be an attachment plate) on the instrument. This engagement means is formed from a metal sheet that is flanged into a suitable form, described below, and attachably welded to the attachment arm 6. More particularly the second engagement means has a large planar surface part 8, that is intended to be directed towards the attachment device part arranged on the beam on attachment of the instrument to a beam or such on the working machine. This planar surface part forms the bottom of channel 10 but is restricted by one of the opposing sidewalls 9. The sidewalls 9 converge upwards towards each other and form internal converging surfaces of the engagement means. The engagement means also has a planar surface part 11, that lies opposite to the large planar surface part, that converges towards the large surface part 8 in the upwards direction in order to form converging internal surfaces of the second engagement means together therewith. This engagement means therefore has channel tapered in the upward direction in two planes that are substantially perpendicular to one another.

Fig 3 schematically illustrates how a first, male-type engagement means of the attachment device is attached to an attachment frame 12 or such on a working machine's beam or arm. Fig 4 illustrates the construction of the first, male-type engagement means in more detail. It shows external converging surfaces having a convergence corresponding to the internal converging surfaces of the second engagement means. A large planar surface part 13 intended to be driven into contact with the large planar surface part 8 of the second engagement means to give the instrument good support relative to the beam therefore also exists here. Lateral outer walls 14 converge in the upward direction to the same degree as the sidewalls 9. A surface part 15 extends opposite to the planar surface part 13, so that the surface part 13 and 15 converge upwards to the same degree as the surface parts 8 and 11.

Fig 5 schematically illustrates how the so-called "docking operation" takes place, i.e. how the instrument is attached to the working machine's beam via an attachment device. The female type engagement means has an opening 16 intended to be directed against the beam on attachment, so that the male type engagement means 17 with its point 18 can be driven somewhat angled into the opening 16 to push against the planar surface part 8. When this position is reached the driver angles the attachment frame 12, and thereby the male type engagement means 17, and then lifts the said means 17 so that it moves into the channel 10 into play-less contact of the external converging surfaces against the internal converging surfaces by means of the force of gravity in two different convergence planes. When this has taken place the instrument is then fixedly locked to the beam via a locking arrangement included in the device, which will now be described with simultaneous reference to Figs 6 and 7.

The locking arrangement has, on one hand, a recess 19 in the form of a through-hole arranged in the instrument part, more particularly in the planar surface part 8, and, on the other hand, a locking unit arranged in the working machine's attachment frame 12. The locking unit has a wedge element 20 that is movably controlled via a control means 21 to move out of the frame 12 for insertion into the recess 19 to an active locking position and out of the recess to an inactive position. For this reason the locking element is connected to a dead-centre-defining toggle joint 22, between whose one end 23 and a stop bolt a compression spring 24 is arranged. The locking arrangement even has a power means 25 in the form of a hydraulic cylinder, whose piston rod is connected to the toggle joint device's 22 toggle joint.

The function of the locking arrangement is as follows. When this is in the active position shown in Fig 6 the wedge element does not project out of the attachment frame 12 and this position is

maintained during the insertion of the attachment device's male-type engagement means in the female-type engagement means to the locked position. Thereafter the hydraulic cylinder 25 is controlled to extend and thereby press the toggle joint downwards while compressing the compression spring 24, i.e. while storing potential energy in the spring. This means that the wedge element 20 is pressed into the recess 19. A dead centre of the toggle joint device is thereby passed, so that this can return to the inactive position without the influence of the power means 25. The power means is not therefore required to deliver continuous power to hold the locking arrangement in the active locking position. In this position (see Fig 7) the compression spring will try to release the maximum amount of potential energy and hold the locking element pushed as far as possible in the recess the whole time. This guarantees a constant play-free locking. The wedge element will also, via its downwardly directed wedge surface 26, constantly force the instrument downwards relative to the beam and thereby push the male-type engagement means upwards in the female-type engagement means and supplement the force of gravity in its holding function.

The inventive device therefore provides the possibility to achieve a play-free attachment and locking of an instrument to a beam or such of a working machine according to the rapid attachment principle, i.e. without the driver having to leave the driver's cabin of the working machine.

The invention is of course not in any way limited to the preferred embodiment described above, but a number of modification possibilities thereof should be apparent for a person skilled in the art, without having to deviate from the basic idea of the invention as defined in the attached claims.

For example it would be completely possible to arrange the female-type engagement means on the beam or such and the

male-type engagement means on the instrument instead, and these would then have the shape of a V instead of an inverted V.

It is even, in principle, possible for the engagement means to have fewer or more converging surfaces than what has been illustrated above. In principle substantially cone-formed male type engagement means would be possible, even if the above described embodiments are preferred in relation thereto because of the possibility of more simply inserting the female-type means and probably even of attaining a better stability in the attached position.

As regards the use of the words "upward" and "vertical" in this document these words relate to the usual position which the working machine and the instrument have when they are resting on horizontal ground, and departure from said directions will of course occur when the working machine and/or the instrument are/is otherwise directed.